

FOUR DOUBLE-ENDED PERAHU LAMBO

NICK BURNINGHAM

*Northern Territory Museum of Arts and Sciences
GPO Box 4646, Darwin, NT 0801, Australia*

ABSTRACT

The hull forms of four double ended Indonesian *Perahu lambo* are discussed. The *perahu lambo* is regarded as a borrowed western design but similarities of hull form to the traditional double ended *perahu soppe* are noted.

KEYWORDS: *perahu, lambo*, sailing boats, maritime technology, Indonesia.

INTRODUCTION

Perahu lambo are the most westernised and amongst the most recently evolved trading sailing vessels in Indonesia. They are characterised by straight stem and stern post, straight keel, median rudder hung on the stern post and sloop or ketch rig.

The majority of *perahu lambo* have a counter stern but some have transom sterns and some are double-ended with a platform or gallery built over the stern.

In the past some fairly large *lambo* were built with transom stern or double-ended. In the late 1970's a few double-enders of about 40-50 tons burden were trading but these were all old boats (pers. obs.). The double-enders which are still trading in the late 80's are probably all under ten tons.

This paper is a survey of four small double-ended *perahu lambo*. Three of these are now in Darwin. The other, *Sama Biasa*, is in the collection of the West Australian Maritime Museum. Following the descriptions of these four vessels, similar double-ended craft of more traditional design from various places in Eastern Indonesia, usually called *perahu soppe*, *sope* or *sopek* are described. The possibility that some characteristics of double-ended *lambo* design are derived from *perahu soppe* is discussed.

Lines, sail plans and construction details of the four *perahu lambo* are presented but *perahu soppe* are described only in a generalised manner. I hope that it will be possible to take lines off and survey thoroughly some *perahu soppe* before they completely disappear.

Two of the vessels described in this paper: *Sejarah Islam* and *Wantoramata III* are from neighbouring islands in the Tukang Besi Islands which lie to the south-east of Buton (Butung) off the south-east of Sulawesi. Buton and the Tukang Besi Archipelago can be regarded as the centre of *lambo* building. Indeed *perahu lambo* have elsewhere been classified as "*Butung Lambo*" (Horridge 1981:66).

Sama Biasa, the *lambo* in the collection of W.A. Maritime Museum, is from Pepela on the island of Roti where many of the boatbuilders trace their ancestry to the Tukang Besi Islands (pers. comm. with Pastor Franz Lackner - Catholic Missionary to Roti and Savu, and communication with crews of boats from Pepela).

The fourth vessel *Sama Saja* is from Selaru, the most southerly of the Tanimbar Islands where there is no obvious connection with Buton or the Tukang Besi islands.

SEJARAH ISLAM

Sejarah Islam is a very small *lambo*, only 6.4m long and fine lined. She was built on Tomea in the Tukang Besi archipelago (5° 40'S, 124°E). She was used mainly for small cargoes and collecting voyages. Her owner, La Biru, said she had been sailed to Singapore, where she was probably smuggling rare birds from Eastern Indonesia.

In 1979 she was used to carry fish trapping equipment to the Macan islands (7°S, 121°E) for a season of trapping and salting fish. At the end of the season she was sold to the author and Mr Daniel Dwyer who sailed her to Darwin.

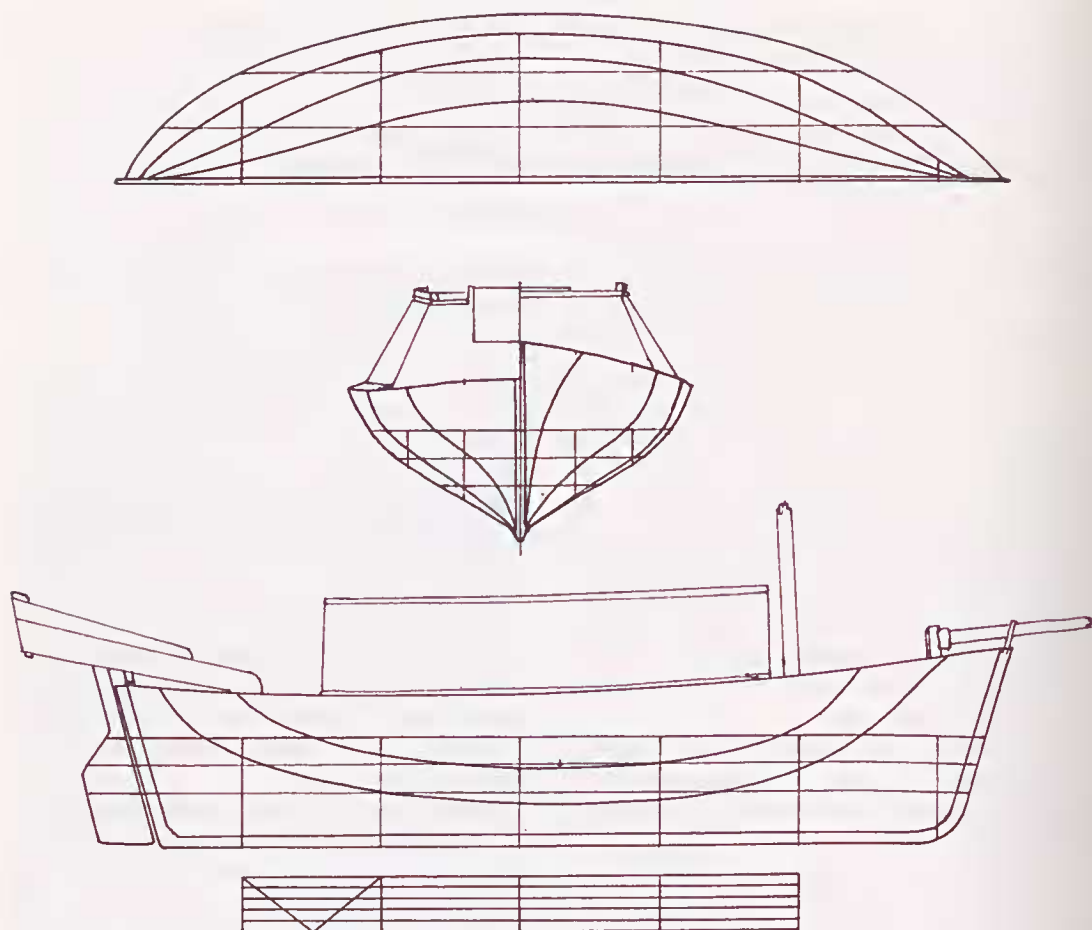


Fig. 1. Lines of *Sejarah Islam*

At that time her owner said she was eight years old. Others felt she might have been older.

There is some evidence that she started life with an Indonesian lateen rig (*layar lete*). On the foredeck, under the bowsprit there was the chock for the heel of the spar of the *lete* rig. The *lete* rig has a spar held permanently at the bow so that it lies fore and aft and cannot be angled thwartships. Small open double-enders with this rig are common in the Tukang Besi islands, especially in the Bajo communities.

Sejarah Islam was later renovated in Darwin by Mr Michelle Viet who sailed her to Gove in the Gulf of Carpentaria, back to Sulawesi, Indonesia and returned to Darwin. Since then she has had a number of owners and has suffered periods of neglect. At other times she has been carefully repaired and maintained to keep her sound and still sailing.

Hull form. The lines of *Sejarah Islam* (Fig. 1) were taken off by the author in Darwin in 1981. As they have later been redrawn from a water damaged set of lines, there may be some inaccuracy.

The profile on the sheer plan shows straight keel, straight stem and stern-post which are considered to be western introductions (Horrige 1979:41). However the lines are quite distinctive and not obviously a copy from any western model. A more than superficial resemblance to the New England "Block Island Boat" (Chappelle 1951:175, Fig. 64) has been suggested, but these boats certainly never reached Indonesia.

There is considerable deadrise (approximately 31°), and the bilges are slack. The turn of the bilge is harder forward where a shoulder of the bilge is carried into the bows and provides bouyancy in the section where the mast is stepped. The entry and run are

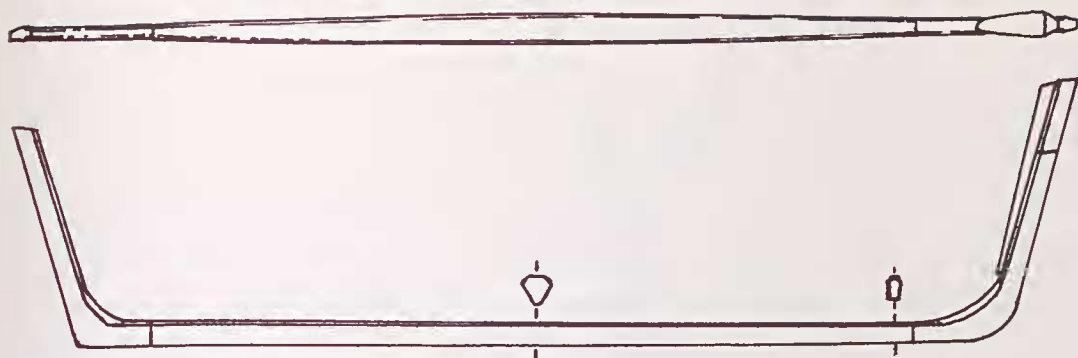


Fig. 2. Keel, stem and sternpost of *Sejarah Islam*

both slightly hollow. Above the water-line she is rather round and full aft.

Freeboard is low. In order to sail she must be well ballasted. With a cargo she would sail with only 200-300mm freeboard and on short voyages La Biru used to load her until her aft deck was at the water line. The inboard sloping cabin-sides effectively contribute freeboard and bouyancy. The cabin-sides and ends are as heavily planked as the hull.

Construction. The construction is heavy for such a small boat. Planking is 40mm or more in thickness. It is *Vitex pubescens* or *Vitex gofassus*, both dense tropical hardwoods.

The frames are not heavy by Indonesian standards, but moulded 80mm and sided 65mm they are still substantial for such a small vessel.

Construction of the cabin was similarly heavy and this made her crank unless properly ballasted. With the original heavy planked cabin roof she could hardly remain upright without ballast.

Like all Indonesian *perahu* she is shell constructed. The planks are carved to shape and fitted together with edge dowels at 200mm intervals. The ribs were fitted after the shell was planked-up. In small heavily planked vessels such as *Sejarah Islam* the shell is fairly rigid before the ribs are fitted. The ribs help to tie the planking together and take the strain from the shrouds; the lanyards of which are usually led directly to the top pieces (*taji*) of the frames. The planking was fastened to the ribs with wire nails and a few treenails. Michelle Vict and subsequent owners reported that almost all the nails were rusted through. She has been largely refastened and keel bolts have been fitted: origi-

nally she had no keel bolts. Larger *perahu* usually have keel bolts and more secure fastenings.

The keel is tapered towards the ends so that it is widest midships. Below the garboards the keel has a "V" section. Near the ends where the stem and stern posts are morticed on, the keel has a rectangular section (Fig. 2). The stern post is a single grown timber with a crook forming the angle between keel and stern post. The stem is a similar crooked timber but this timber does not reach the top of the planking, a short piece of timber butted on forms the top of the stem. The two parts of the stem were not joined but both were fastened to an apron. The upper portion of the stem was only lightly fastened to the apron and had no structural function.

The Rig and Sail Plan. The original rig was set on a fairly tall mast that was both raked and curved aft (Fig. 3). The sail area was large, the mainsail was hoist well above the mast head on a gunter spar. The author recut the mainsail reducing the height by about 1 meter for the voyage to Australia. The sail area was still very adequate. Mast height and sail area have twice been reduced in Australia. The bowsprit is short for a *perahu lambo*.

There are no jaws on the boom. It lies to one side of the mast and is held to the mast by a strop. Reefing is achieved by unstrapping the boom and simply rolling a portion of sail onto the boom.

Performance. *Sejarah Islam* performed well in company with other *perahu* though she could not be expected to keep up with larger vessels when reaching or running in a stiff breeze. She proved more weatherly than any *perahu* she met going to windward.



Fig. 3. Sail plan of *Sejarah Islam*

While *Michelle Viet* had her at Gove she won a race for cruising yachts and beat yachts of considerably greater size. She could not keep up with a good cruising yacht going to windward but when reaching she proved very competitive.

She is rather slow and unsure in stays.

WANTORAMATA III

This vessel was built in 1985-86 to be a fast example of her type. She was built at Kaledupa island (5°30'S, 123°40'E) northwest from Tomca where *Sejarah Islam* was built. The builders were natives of Kaledupa who spoke the local language. However Kaledupa formerly had a very large Bajo population. Bajo, some times called the Sea Gypsies are found in settlements all over coastal South east Asia. Traditionally they live in boats or

in houses built on stilts over the sea. Most of the Kaledupa Bajo population have moved away, many of them settled at Pantai Mola on the neighbouring island of Wangi Wangi. The village of Buranga on Kaledupa where *Wantoramata III* was built is in fact not a Bajo village but looks like one because the houses are built over the water with stone causeways connecting them. *Wantoramata III* was built on beams suspended across the water between stone causeways. On her registration papers she is described as a "*Lambo Soppe*". *Sope* the name of the large double-ended canoes of the Bajo is probably a cognate term.

While still new this vessel was purchased by Messrs Daniel and Bernard Dwyer who sailed her to Darwin.

Hull Form. The lines of *Wantoramata III* (Fig. 4) are very similar to those of *Sejarah*

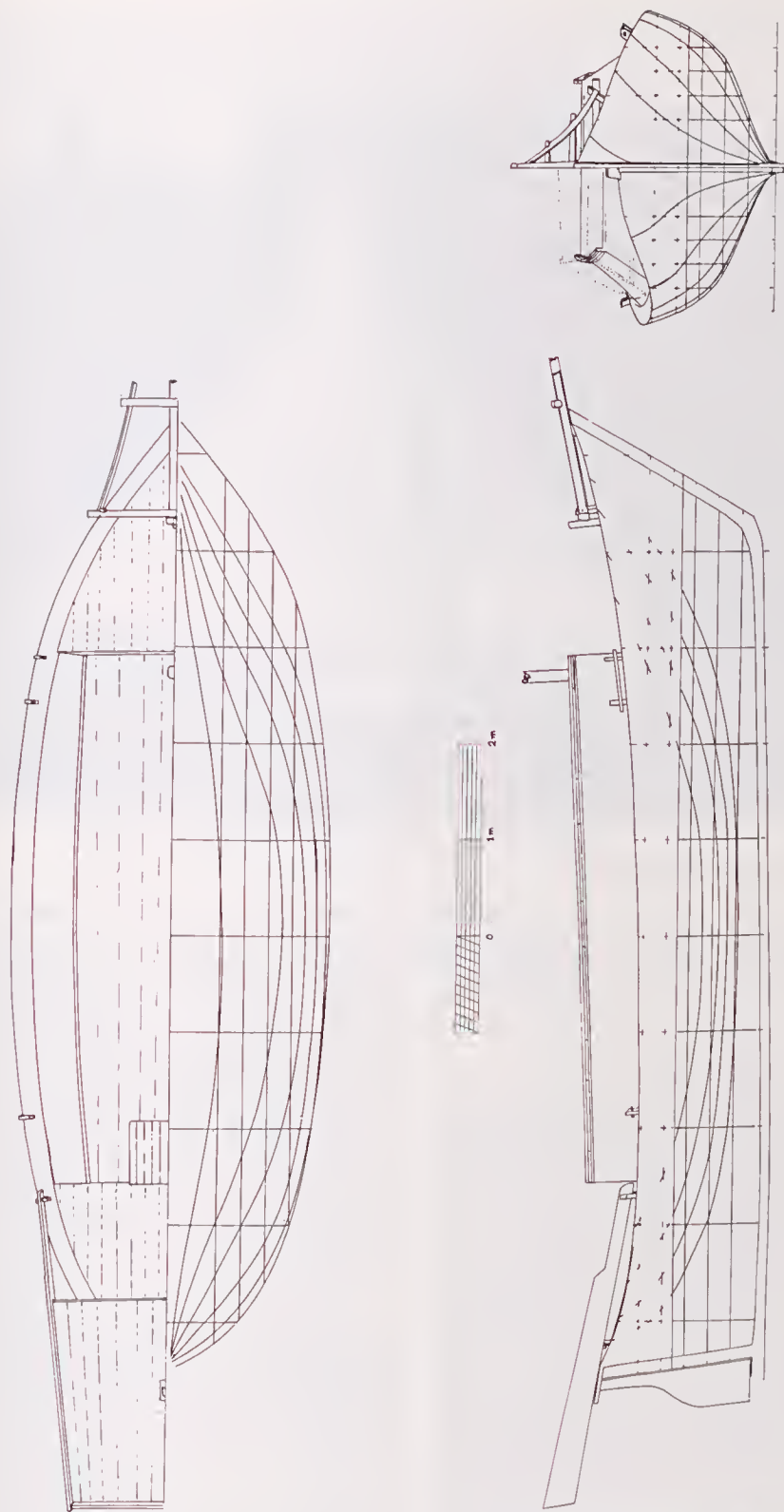


Fig 4. Lines of *Wantoramata III*



Fig. 5. *Wantoramata III* at Kaledupa

Islam. She has the same type of midship section showing deadrise, slack bilges and flared topsides. Freeboard is greater relative to other dimensions. The entry and run are long and a little hollow. Above the water-line the stern is rather round.

The stem is more raked than that of *Sejarah Islam*, while the stern post is more vertical. The near vertical stern post is typical for Kaledupa double-ended *lambo*. The greater rake of the stem is typical for *lambo* built almost everywhere in recent years. The oldest *lambo* usually have a plumb stem or nearly plumb stem. The average angle of rake seems to have increased gradually over the years (Horridge 1981:67; Burningham 1987:106).

Construction. The construction is lighter than *Sejarah Islam*. The planking is of about the same thickness but of a lighter timber, locally known as *kayu walu*. The ribs are mainly *kayu walu* (species not identified) and some *Intsia bijuga* (*kayu merbau*) a very hard dense timber. They are spaced at 220mm

between centres. They are moulded 100mm and sided only 75mm, this is light but closely spaced framing for a vessel of this size by Indonesian standards. A similar proportioned *perahu lambo* from Bonerate, *Hati Mulia* (now in Darwin) has frames approximately 90x115mm at 300mm centres.

The workmanship on *Wantoramata III*'s hull is excellent. Her planking seams are all completely tight and the frames are very exactly shaped and fitted. The bilge remains dry unless rainwater or spray enters through the deck or cabin.

The construction of the cabin is relatively light and the carpentry less sophisticated. There seems to be a different approach to the construction of the cabin which is sound but not built to the same standards as the hull. As with *Sejarah Islam* the cabin effectively contributes to the freeboard and buoyancy of the vessel when laden. With low initial stability she could be swamped if sailed without the cabin while carrying her tall sloop rig.

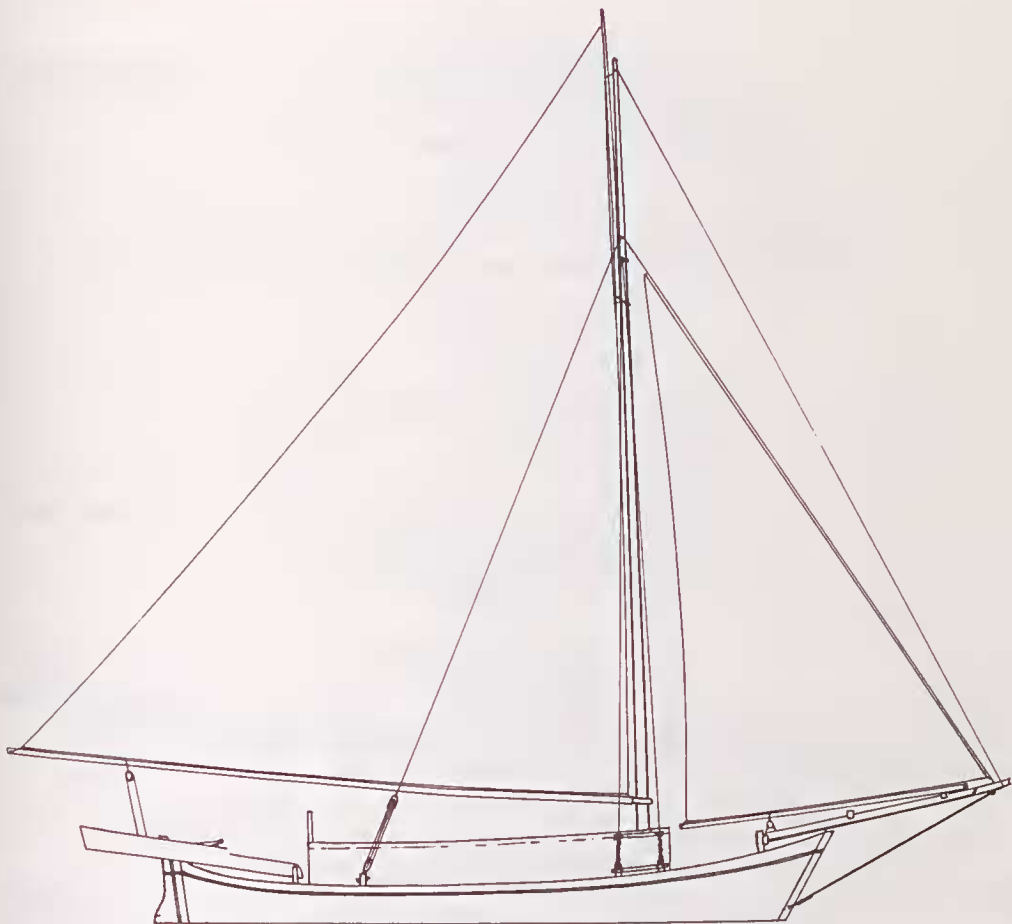


Fig. 6. Sail plan of *Wantoramata III*

Rig. The sail plan is similar to that of *Sejarah Islam* (Fig. 6). The mast is raked but straight. The main boom is very long and awkward to handle. It requires a preventer sheet to relieve the strain in the middle of its length in any real breeze. The jib is cut long in the leach so that the boom, if not supported by its topping lift, would hang below the bowsprit at the clew. This is normal for *perahu lambo* although it is less extreme in recent years than formerly when it was necessary for many *perahu* to sheet the jib's boom exactly fore and aft to go to windward.

Performance. Even with rather full cut sails and a draught of only 1m *Wantoramata III* is more weatherly than most *perahu* particularly in light winds with a head sea where her sharp lines and relatively light build give her an advantage.

Like *Sejarah Islam* she comes about slowly and is sometimes unsure in stays. Her rudder

is rather small for manouvering. She requires ballast to sail.

SAMA SAJA

This vessel was built at Eliasa village on Selaru Island, the most southerly of the Tanimbar Islands in the South Moluccas. She is unusually beamy by any standards but can be regarded as representative of a class of small scruffy *lambo* of South Maluku (Moluccas) used for carrying small amounts of market produce, occasional sacks of cement and passengers who are frequently relatives of the owner. These vessels play a similar role to the family station wagon in rural Australia. *Sama Saja* was sailed to Bathurst Island, north of Darwin by her owner Simon Petrus Boinsera and five companions, three male and two female in 1986. One of the men, Dominggus John Kelmaskosu, had twice sailed to north

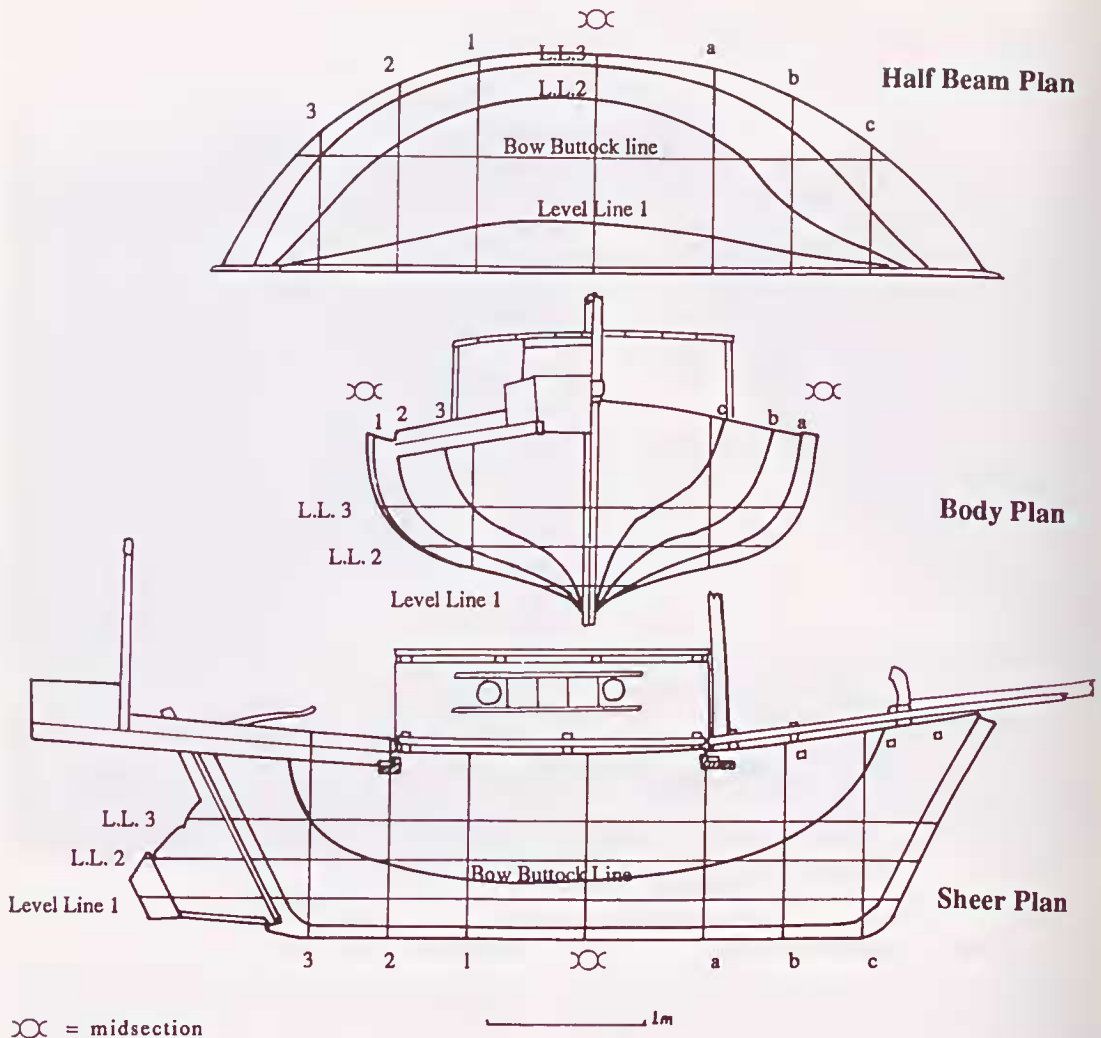


Fig. 7. Lines of *Sama Saja*

Australia in canoes during the 1960's and seemed to be the instigator of this voyage.

At Bathurst Island contact was made with local Aborigines and subsequently *Sama Saja* and her crew were apprehended by Australian Customs and immigration officers. *Sama Saja* was towed to Darwin where she was later purchased by the Museums and Art Galleries of the Northern Territory, and is now registered in the Southeast Asian material culture collections as IND 829.

Although very scruffy and unpainted except for a coating of asphalt and lime below the water-line she appears to be nearly new. Adze and axe marks on her timbers are quite clear. Simon Boinsera said she was two years old in 1986.

Hull Form. The lines are shown in Fig. 7. The beam of this vessel is quite extraordinary. The length beam ratio is 1:1.75 which must be almost unequalled in sailing vessels. The midsection is very different to that of the Tukang Besi Archipelago boats. She has moderate deadrise with very marked hollow. The turn of the bilge is fairly slack and continues all the way to the rail. The entry is very hollow below the waterline but she is fuller aft so that there is more forefoot than heel. A huge crude rudder compensates for the lack of heel.

The lines shown here are necessarily an approximation because the planking is not faired and the hull is not symmetrical. The lines shown are taken off the starboard side.

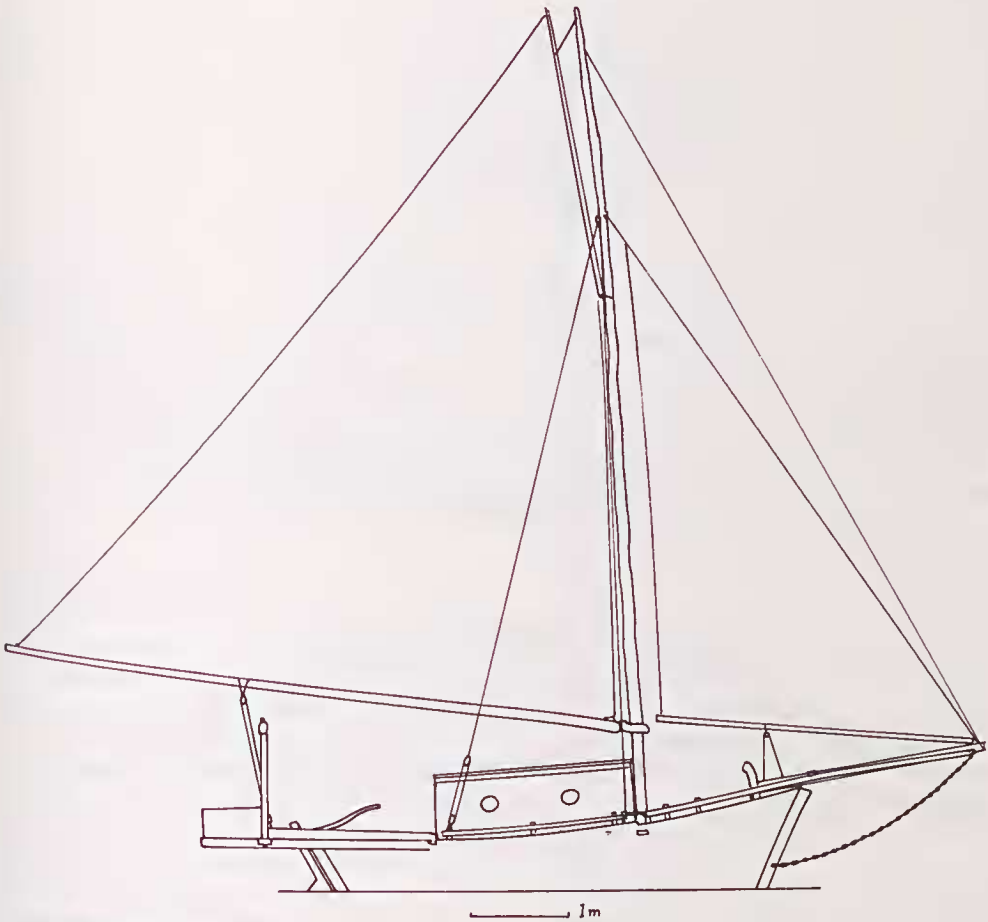


Fig. 8. Sail plan of *Sama Saja*

Construction. The planking is not of uniform thickness but much of it must be over 50mm thick. It is mainly *Vitex pubescens* or a very hard *Vitex gofassus*. The planks are irregular in shape and the run of the strakes is also irregular. Few planks are much over 1 meter in length. Some of the butts are at 45° to the run of the strakes.

Ribs are irregularly spaced, on average about 450mm between centres. In some cases they are roughly fitted tree limbs only faced to fit against the planking. Some of the floors are damaged by insect borers and were probably taken from an old vessel that was broken up. Every third floor has a keel bolt. There are not frames without a floor but the top futtocks are positioned midway between frames. The planking is fastened to the frames only with wire nails. Some of the ribbing clearly has very little structural value.

Stringers are no more than split saplings nailed in place. They only help to keep a cargo off the planking.

When purchased by the Museum, *Sama Saja* required pumping fairly frequently, preferably every 24 hours. She had been anchored in Darwin harbour in a place where she took ground on every tide. Considering this and the roughness of her build it is surprising that she could be kept afloat at all, far more that she could be left unpumped on a mooring for 48hrs.

The decks are appallingly scruffy and could never be made completely water-tight. The seams gape and the planks are inadequately fastened to inadequate beams. The wider seams were caulked with strips cut from rubber sandals known in Australia as "thongs".

One surprisingly sophisticated feature of the decking is the massive beams that are

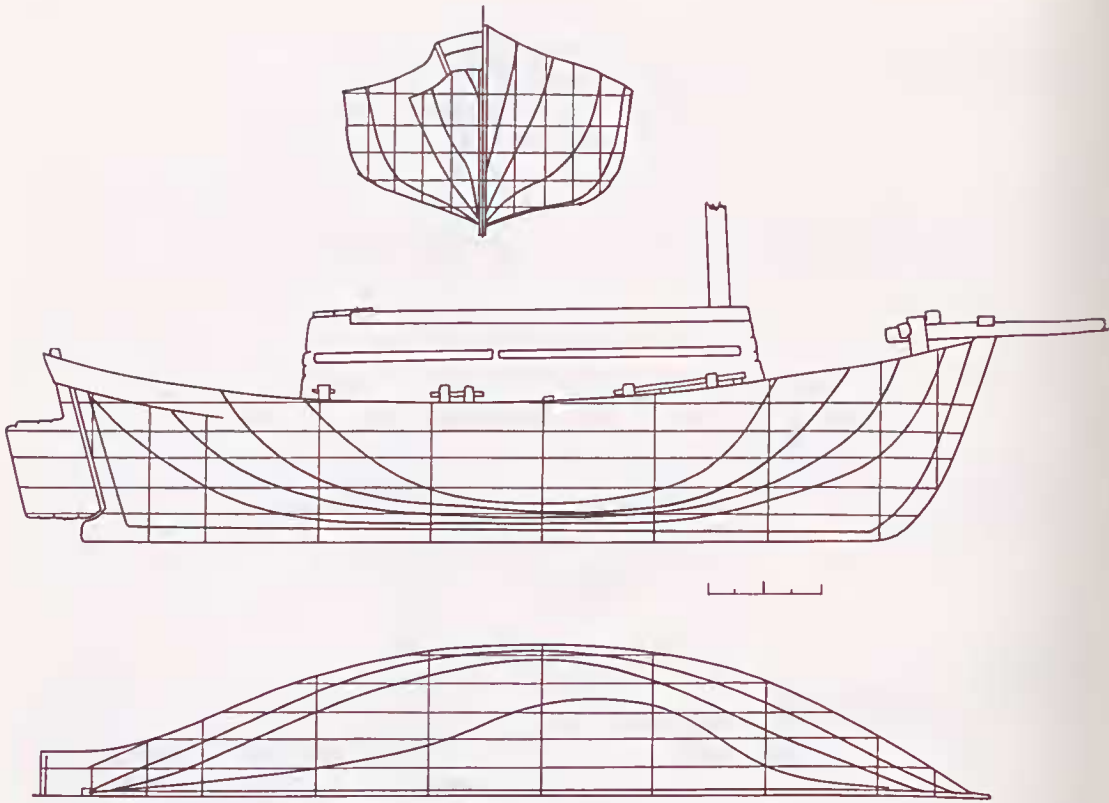


Fig. 9. Lines of *Sama Biasa*

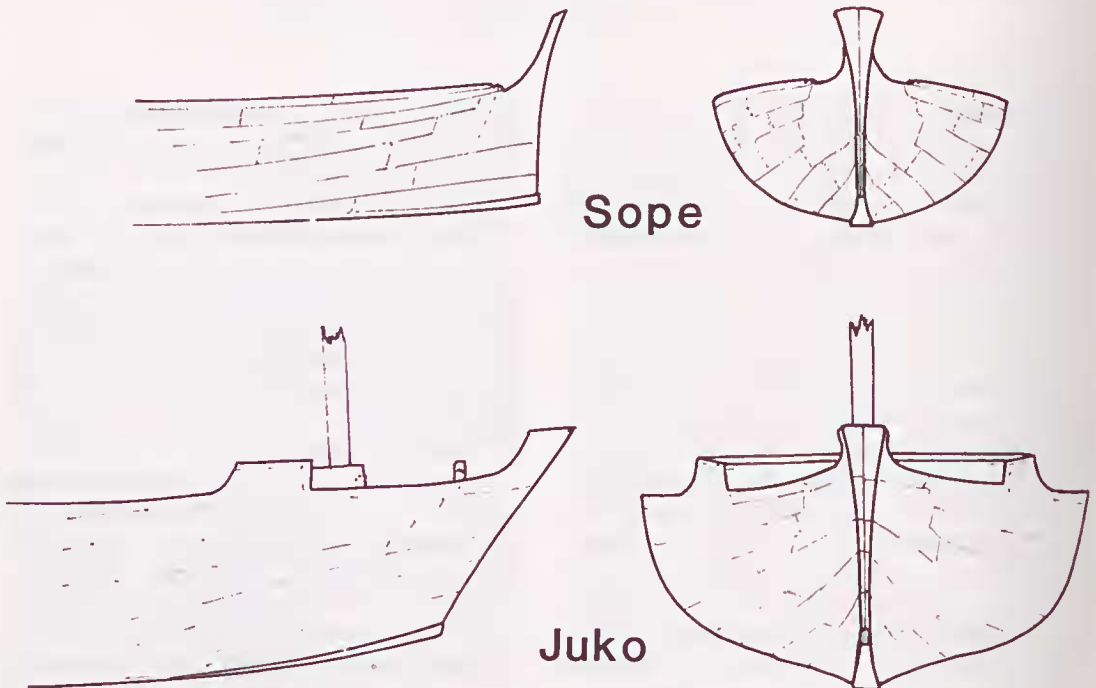


Fig. 10. Bows of Ende *perahu sopek* and *perahu juko*

made with "L" section to form a channel leading to the scuppers and prevent water running off the decks into the cabin.

Rig. The sail plan (Fig. 8) is fairly similar to that of *Sejarah Islam* and *Wantoramata III*. the jib is of lower aspect ratio and the rig projects further forward on the bowsprit and aft on the boom. In fact almost half the boom's length is aft of the stern post but this is necessary to drive such an ungainly hull. The mast was newly stepped for the voyage to Australia and was taller than the previous spar (pers. com. Boinsera).

The standing rigging was very poorly set up. The shrouds were set up with lanyards to a short rail nailed to two projecting top futlocks. The chain bobstay was set up too slack to stay the bowsprit, which was secured to the stem with a bolt and morticed through the samson post.

Curiously the mainsheet was rigged through dumb sheaves as a five part tackle; some *perahu* large enough to load fifty tons of cargo have only four part mainsheets. Some other details of the boat were quite whimsical. The cabin, although more roughly constructed than a packing case, has on each side two carefully sawn round port-hole-like apertures with sliding covers. These, along with the mainsheet cleat represent by far the most elaborate carpentry on the vessel.

Performance. The author was able to sail this vessel on three occasions. In sheltered water she proved fairly swift, quite able to make ground to windward and very handy – particularly fast in stays. Presumably a choppy head sea would severely prejudice her windward performance and she would be difficult to steer in good breeze. She was stiff without ballast of course.

SAMA BIASA

This vessel is fairly typical of a class of small double ender built at Pepela, Roti Island, Nusa Tenggara (10°20'S, 123°25'E). It is possible that she is unusually full in the midsection and does not represent the best building seen at Pepela. These boats are used for collecting and fishing voyages to the islands and reefs lying south of Roti and inside Australian territorial waters (where traditional fishing by Indonesians is allowed according to a memorandum of understanding). These boats also trade around Roti and to

Kupang, West Timor. Some make the voyage to Ujung Pandang (Makassar) to sell trochus shell, tortoise shell, trepang and other products of the collecting voyages.

Occasionally illegal voyages are made to the Australian mainland especially to poach trochus shell from the rich banks outside King Sound. *Sama Biasa* was apprehended on such an operation at Gregory Island in the Buccaneer archipelago. She was confiscated and donated to the Western Australian Maritime Museum.

Her lines were taken off by Mike McCarthy and Mike Pollard of the Western Australian Maritime Museum. Fig. 9 is traced from the lines as drawn by Mike McCarthy and Mike Pollard.

Hull form. The midships section shows little deadrise with slight hollow. There is a fairly hard turn to the bilge and little flare in the topsides. The run is unusually long and the full midsection short. There is some hollow in the entry below the water-line.

The hull form is significantly different from that of *Wantoramata III* or *Sejarah Islam*, particularly the midships section. The midsection coefficient (area of immersed midsection / limiting rectangle) of *Wantoramata III* is 63% while the midsection coefficient for *Sama Biasa* is 80%.

Although the hull forms are different there are many similarities of style. The cabin has a similar shape with inboard sloping sides and a flat top. On both *Sama Biasa* and *Wantoramata III* the mast is stepped through the cabin roof and this is not usual for *perahu lambo* which in most cases have the mast stepped forward of the cabin.

Ratios of length to beam for *perahu lambo* are consistently close to 3:1. *Sama Biasa* and *Wantoramata III* have length:beam ratios slightly lower than 3:1. *Sejarah Islam* has relatively greater beam, her length:beam ratio is 2.67:1.

Construction. *Sama Biasa* is fairly roughly constructed. Her planks are mainly *Vitex* sp. (*Kayu kolar*) and they are short and heavy. Frames are on average moulded and sided 90mmx90mm and the finish is not good.

Rig. *Sama Biasa* carried a gunter sloop rig.

PERAHU SOPPE'

Perahu sopek, soppe' or *sope* are names given to a number of similar small craft in

Eastern Indonesia. They are usually double-ended and similar in form to double-ended *perahu lambo*.

At Ende on the south coast of Flores a distinctive local boat made in several sizes is called *perahu sope*, *sope bajo* or *juko*. These vessels have no stem or stern post. The planking simply meet at the ends. *Perahu sope* are traditionally built up from a dugout although in recent years most are built with a keel. Small *sope* are sprit rigged and larger *sope*, which have decks and cabins, carry a gunter cat rig. Because there is no stem structure, there is no bowsprit or headsail. *Perahu sope* of Ende have a distinctive bow profile rather like that of South Sulawesi canoes. Other boats at Ende with the same stemless structure have a more raked bow profile, they are called *perahu juko* (Fig. 10).

On the island of Paloe off the north coast of Flores *perahu sope* of similar design and structure were built until recently. Some were built with outriggers others were rather deep hulled cargo vessels with no outriggers. Traditionally they carried a tilted rectangular sail (*layar tanja*).

At Oe Seli on the south coast of Roti a few *sope* still exist. Some have a dugout base and others have a keel. The lowest planks meet at the ends but there is a stem starting at the second or third strake. These boats are Indonesian lateen rigged (*layar lete*). All these types of *sope* have quarter rudders, they do not have a rudder hung on a stern post because there is no stern post.

The *sope* of Roti are very similar to other open lateen rigged boats with stem and stern post which are much more common on Roti and neighbouring Pulau Semau. These other boats which have stem and sternpost have large carved rudders hung on their stern posts.

The double-ended *lambo* of Pepela Roti such as *Sama Biasa* are scaled up versions of the lateen rigged boats.

Similarly *Wantoramata III* and vessels like her are scaled up from the open lateen rigged boats of the Tukang Besi archipelago. *Sejarah Islam* probably started life with a lateen rig and an open hold.

I am not aware of any stemless designs in the Tukang Besi islands but the double-ended *perahu lambo* there are designated *perahu lambo soppe* (on registration papers) which suggests that the design is taken from a *sope* design.

The various *sope* of Flores and Roti all have similar style and structure but have quite different midsections. The Roti *sope* are heavy with a full section (like *Sama Biasa*). The boats of Ende have moderate deadrise and very easy bilges. At Paloe there seemed to be two distinct styles. One with a round bottom and slab sides - more like a canoe, the other type had considerable deadrise and very flared topsides rather like the Tukang Besi boats.

C. Nooteboom in an account of boats at Ende (Nooteboom 1936, translated Horridge and Snoek) says:

"The boats of the south coast are round in cross-section, those of the north have the form of a "V" although otherwise the various types of vessels are superficially similar in the two areas."

Sope or *sapa* were apparently more widespread and there were a number of distinct types in the 1930's. Nooteboom mentions *sope*, *sapa sangge*, *sapa bajo* and *sapa monda*.

DOUBLE-ENDED PERAHU LAMBO DESIGN DERIVED FROM PERAHU SOPPE'

Some of the main distinguishing features of double-ended *lambo* design are introduced western design. The straight stem and stern post structure, the stern-post hung rudder, and the rig are all introduced. Other less obtrusive but significant features seem to be derived from indigenous design. The hull profile, midsection and form are all like those of *perahu soppe'*. In some cases construction details could be derived from the built-up dugout design of the *soppe'*. The "V" section keel and structurally redundant upper stem of *Sejarah Islam* could be interpreted in this way.

There has been a tendency to regard *perahu lambo* as a crude or flawed copy of similar western fore and aft rigged vessels. It has been said that they sail badly (Gibson-Hill 1950:134; Horridge 1979a:37), that they are crudely modeled and crudely constructed (Gibson-Hill 1950:132; Horridge 1979a:32, 35; Hawkins 1982:129) and that they are unaesthetic (Gibson-Hill 1950:132; Hawkins 1982:123). Some of these comments seem to be motivated by a preference for more traditional craft which the *lambo* tend to replace. It has even been suggested that real sailors

would not select *perahu lambo*: that the West Sulawesi *lambo* (often called *perahu bago* or *palari*) which has a traditional Indonesian hull form is "altogether more of a sailor's boat" than the "Butung lambo" (Horridge 1981:16).

Most of these comments are applicable to vessels such as *Sama Saja* and perhaps *Sama Biasa* but disregard the evolved and successful indigenous hull form of well built vessels such as *Wantoramata III*.

NOMENCLATURE

The spelling of *perahu* types and Indonesian nautical terms, e.g. *lambo*, *sope*, *soppe*, *sopek*, *lete*, etc. conforms with the spelling used on vessel's registration papers where these have been seen by the author.

In other cases the spelling was provided by local boat owners. The form *soppe* is from the Makassan and Bugis dictionaries of Cense and Matthes respectively and was suggested by Dr Campbell Macknight.

The spelling *lambo* equates with *Lambok* in Gibson-Hill (1950) and Hawkins (1982) and *lete* equates with Gibson-Hill's *leteh* (1950) and with *leti* used by Horridge (1981 and 1986) and Hawkins (1982).

GLOSSARY OF NAUTICAL TERMS USED IN THE TEXT

Clew

Aft lower corner of a sail

Deadrise

This term is fairly frequently used and understood, however comprehensive definition is difficult and uncommon. A survey of definitions in the literature produces some definitions that are simple but imprecise: "Vertical distance between keel and turn of bilge" (Palmer 1975:58), while others seem precise but virtually incomprehensible. For instance: "DEADRISE. Height to which a vessels frame rises from the horizontal as measured to intersection of a vertical, tangent to the molded depth distant point, with a line of frame extended from vessels keel;" (McEwen and Lewis 1953:124).

The following definition is an attempt to define deadrise as used in this paper and it is intended to conform with the use of the term by Howard I. Chapelle and David R. MacGregor.

Deadrise is an angle measured on the mid-section or other cross-section of a vessel on the body plan (see Fig. 11). The deadrise angle at the midsection may be defined as the angle subtended at the point where the mid-section outline meets the keel, by a line tangent to the midsection's outline and a horizontal line in the plane of the midsection (Fig. 10a,b,c). Traditionally this was usually expressed as inches per foot rather than degrees of angle.

In the run (q.v.) the deadrise can be the rise of a section's outline measured above the hollow of the deadwood area. In this case it is a question of visual interpretation rather than precise definition. An example of this usage is the concept of "constant deadrise" (Chapelle 1967:403).

Entry

The hull form forward of the midsection.

Flare

Angle outwards of the hull above the turn of the bilge. Shown on the body plan and sometimes on the buttock lines of the sheer plan near the bow.

Fore and Aft Rig.

A rig in which the principal sails will lie along or close to the fore and aft line of the vessel when they are not pushed out by the wind. Fore and aft sails are defined in contradistinction to square sails which will lie at 90° (square) to the vessel's fore-and-aft line unless pulled around by the braces. Fore and aft sails can be square or otherwise quadrilateral in shape while square sails are not necessarily square or quadrilateral in shape.

Well cut fore and aft sails will allow a vessel to sail closer to the wind than square rig in the circumstances that the sail area is adequate to drive the hull and the hull form gives enough lateral resistance.

Gunter rig.

A fore and aft rig on which a triangular sail is carried abaft its mast and has its head hoist above the mast head on a spar which lies approximately parallel to the mast when the sail is set. The upper part of the sail's luff is bent to the spar and the spar is hoist and lowered with the sail. See Figs 3, 5.

Gunter cat rig.

A single gunter sail carried on a mast stepped well forward. No headsail is carried.

Hard (turn of the) bilge

The turn of the bilge is described as hard if it occurs quickly and if it subtends a consider-

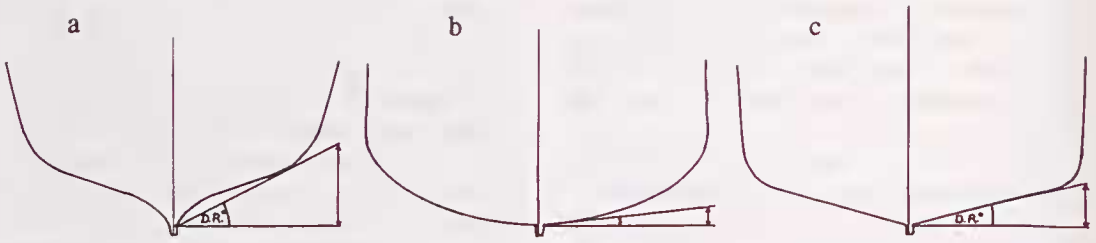


Fig. 11. Three examples of deadrise:

- Deadrise angle shown on a midsection with hollow in the deadrise. There is a large angle of deadrise.
- Deadrise angle on a midsection with an easy turn to the bilge starting close to the keel. The deadrise angle is small.
- Deadrise angle on a midsection with straight rising floors or deadrise and a hard turn of the bilge. Deadrise is moderate.

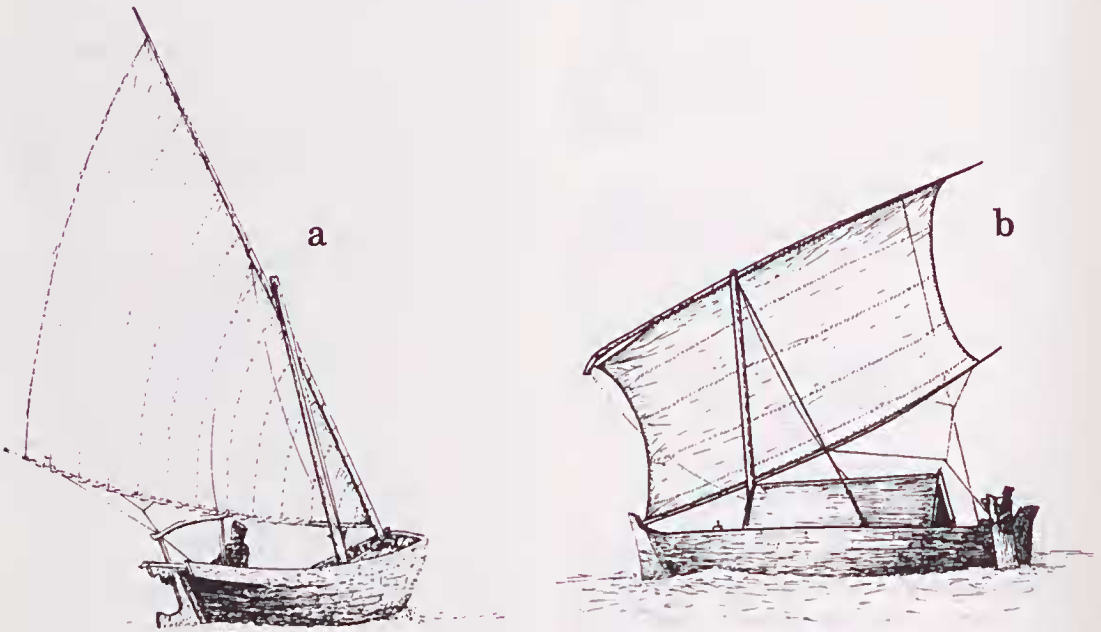


Fig. 12. a. Layar lete. Indonesian lateen sail on a Rotinese *perahu lete*
b. Layar Tanja. Indonesian tilted rectangular sail on a Paloe *perahu sope*

able angle e.g. Fig. 11a and 11c. A hard bilge is usually thought to confer stability and the power to carry sail to windward but may detract from speed and therefore windward ability.

Hollow

The lines of some vessel show hollow or concavity. Most commonly lower water-lines on the half beam plan will show hollow near the bow and stern. The body plan may show hollow deadrise (e.g. Fig. 10a). The quarter

beam buttock line on the sheer plan occasionally shows slight hollow near the load water-line on fine-lined vessels with a counter stern.

Layar lete

Indonesian lateen rig. The sail has a boom laced on its foot. The entire length of the luff is laced to a heavy spar which lies fore and aft with its heel fixed in the bow of the vessel. When changing tack the sail and both its spars have to be taken over the top of the mast. Fig. 12a Roti *lete*.

Layar Tanja

A tilted rectangular fore and aft sail carried between a spar and a boom and handled rather like a *layar lete*. Considered a very powerful but unhandy sail. Fig. 12b.

Leach

Aft edge of a sail.

Luff

Forward edge of a sail.

Midsection

The widest and/or fullest section on the body plan. Usually located near the mid point of the vessels fore and aft line. A vessel which has the same section carried forward and aft is said to have a long midsection. A vessel in which the fullness of the midsection is quickly tapered away into the entry and run is said to have a short midsection.

Run

The hull form aft of the midsection.

Slack (or easy) bilge

A gradual turn of the bilge into the top-sides, e.g. Fig. 10b.

Stays

A vessel is said to be "in stays" while her sails are flogging as she goes about from one tack to the other. If a vessel is fast and sure in stays she comes about readily when the helm is put down. A vessel which is slow and unsure in stays turns slowly in response to her helm and often needs considerable backing of her sails or use of oars to get her round to the new tack. If she fails to tack she is said to "miss stays".

Strake/Straik

A strake is a complete set or run of planks in a continuous line from one end of the vessel to the other. The planking of the hull is made up of a number of strakes and each strake is made up of a number of planks. The lowest strake is the garboard strake and the top strake is the sheer strake.

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